CHAPTER 8

Starting in the Desert
April 1979–June 1980

We have a big army and a little country.
Adir Schapiro, Nature Reserves Authority director [1]

We have viewed with interest the unearthing of certain artifacts, including two human skeletons alleged to be 4,000 years old.
C. Van Landingham, Acting General Manager, Air Base Constructors [2]

Israel encompasses only about 11,000 square miles, counting the occupied territories.[3] The country is barely larger than the state of Maryland. The Negev represents a little less than half of the nation, "5,000 square miles," David Ben-Gurion once wrote, "of sand, eroded soil and mountain."[4] This desert resembles a wedge pointing south to the port of Eilat and the Gulf of Aqaba. To the west lies the Egyptian Sinai. Across the low parched wadi of the Arava, also known as the Jordan rift valley and extending from the Dead Sea to the Red Sea, is Jordan. Moshe Dayan first saw the Negev in 1948, during the war of independence. He called this region of mountains and craters "a wide-open expanse, bare, parched, cragged, primeval." The only plants he saw in this "hot, wild world, void of rain and apparently of dew" were acacia, tamarisk, and "a bush with long hard thorns, sharp as spears."[5] Although it is hottest and driest nearest to the tip, blazing daytime temperatures, clear skies, and dry winds make the region a land to be approached with caution. Rain, when it comes, turns the wadis into churning rivers and makes the clay desert floor a sea of mud.

Not always hostile to human habitation, for centuries the region had supported substantial communities. As long as 5,000 years ago, the northern Negev was the site of "a highly organized and diverse civilization." This "Beersheva culture" included farming, animal husbandry, and copper smelting. The patriarch Abraham came to the Beersheva plain about 1,500 years later. In the days of the Judean kingdom, between 850 and 600 B.C., agricultural

Ramon plateau

settlements based on the careful collection of winter runoff extended as far south as Mitzpe Ramon. Human society in the Negev continued to thrive for several hundred years, with settlements throughout most of the region, even in the extremely hot and dry south. The Nabateans, traders with their capital across the Arava at Petra, built cities astride the route between the Red Sea at Eilat and the Mediterranean at Gaza. They prospered until the Byzantine period, during which Rome's Middle Eastern commerce declined along with the empire's military strength. Only later did the Negev become an arid wasteland. The seminomadic Bedouins and their flocks of sheep remained, indifferent to the potential of irrigation and even dismantling systems for their stone. To a large extent the Negev encountered by the Israelis in the early days of their independence was a man-made desert, developed over centuries of neglect.[6]

The establishment of the State of Israel in 1948 opened a new era in the history of the Negev. The Zionist ideology of the early days of the nation included a commitment to the conquest of the desert. David Ben-Gurion, prime minister during 1949–1953 and again in 1955–1963, personified this dedication. Ben-Gurion be-

Ovda valley

lieved the Negev was the economic heart of the infant nation as well as a source of spiritual refreshment. He made his home at the kibbutz Sde Boker, a struggling agricultural collective in the desert south of Beersheva. For him, transforming the Negev into a center of economic and intellectual activity was an obligation for a generation of Israelis and for Jews around the world.[7]

Settlement burgeoned during the first thirty years of Israeli nationhood. Beersheva became a booming city of 100,000. With its fast food, traffic, and prostitutes, it reminded one American observer of "a frontier town gone mad."[8] By the late 1970s Beersheva marked the edge of the desert with cotton fields and citrus groves as well as sheep ranges to the north. Settlement also spread to the south. Farming communities sprung up, and the government tried to encourage urban settlement by building a handful of small cities: Mitzpe Ramon, Dimona, Yeruham, and one or two others. These so-called development towns, with their apartment blocks stark and forbidding against the desert sky, seemed outposts against the desert itself.[9]

The growth of the Israel Defense Force and the loss of the vast maneuver space of the Sinai had important consequences for the Negev and other parts of Israel. The desert held the largest amount of usable space for the relocation of military training areas and bases. The choice of the Negev for the Israeli Air Force's three new bases—two built by the United States and the other by the Israelis—was inevitable. The redeployment also affected the Israeli occupation of the West Bank. The same process that made the Negev the logical choice for the air bases put pressure on the land resources of the Jordan River valley. The use of large tracts for the airfields greatly reduced the training area available for land forces in the desert. In turn, the lack of usable space led the army to transfer some of its units from the Sinai to the West Bank. Along with this movement came establishment of a network of bases and depots in the occupied territory. So the chain of events that started with the departure from the Sinai solidified the Israeli presence on the West Bank and produced an argument against withdrawing the Israel Defense Force from the territory.[10]

For the two airfields that would be built by the Americans, the Israelis chose locations near the northern and southern limits of the Negev. Ramon, the northern site, was about thirty miles south of Beersheva. Ovda, farther down in the desert, was about the same distance from Eilat.[11] Only about fifty miles separated them, but they differed substantially.

The Ramon tract stood on a plateau called Ramat Matred in the Ramon Mountains, the highest range in the Negev. The mountains marked a transitional zone between the northern highlands, which received about four inches of rain a year, and the more arid southern highlands. Judean residents between 1,000 and 600 B.C. had used the runoff from the annual flood to farm the area.[12] The Nabateans had built the city of Avdat nearby. The ruins, from which an observer with binoculars could clearly see the air base site, overlooked what had been a major trade route and was now the main highway to Eilat. Now the wind swept undeflected over the Ramon tableland, which lay close to the main road but had no connection with it.

The Ovda site was in a valley almost eight miles from the nearest paved road. It had been the staging area for a military operation named Ovda—fact, or fait accompli, in Hebrew—that had outflanked the Jordanian army and assured the fledgling nation of access to the Red Sea during the war of independence.[13] Two ranges of purple hills rose to the east of Ovda. The first separated the valley from the Arava. The higher second range was on the other side, in Jordan.

Site investigations began in the spring of 1979, soon after the first Americans arrived in Tel Aviv. However, the Near East Project Office did not carry out the analysis. The Ministry of Defense hired Israeli firms for the soil studies and laboratory work. These companies had the capability and the equipment and could start sooner. Their contracts were assigned to the American prime contractors. Investigators dug test pits at 400-meter intervals along the lines of future runways and taxiways. They took samples from the two-meter-deep holes and examined them for compaction, density, and moisture. Seismic surveys and laboratory testing of the soil came later. The preliminary visual assessment of the test pits revealed a great deal about the sites. The soils at both places contained similar materials, including limestone, dolomite, chert, flint, and wadi gravel. Within reasonable distances were adequate quantities of rocks suitable for aggregates to be used in concrete or as subbase and base underpaving for runways and roads.[14]

The similarities between Ovda and Ramon were only superficial. The composition and depth of the soils differed significantly. These dissimilarities, recognized from the outset, considerably influenced the construction process. At Ovda the dominant material was a mixture of silts, sands, and gravels. Every year the floodwaters from the surrounding hills washed more of this fine loose substance into the valley. Bedrock was as far as 120 feet beneath the surface, so compaction for construction represented a major problem. Hartung expected that aircraft shelters, other hardened structures, and multiple-story buildings might need pile foundations. Moreover, protection of the air base required the diversion and containment of floodwaters. Ramon was a different story. The dominant surface material was a medium dense loess. When vehicles broke up this surface, it turned into a fine flour-like dust that clung to everything. More important for construction was the proximity of bedrock to the surface. In some places the rock was only six feet below ground, and outcroppings protruded here and there. Early site surveys disclosed huge quantities of rock along the runway axes initially plotted by the Israelis. Rather than dig this material, the Israeli Air Force decided to realign the runways.[15]

Investigations at both sites progressed satisfactorily through the summer. The Israelis completed their test pits and borings for runways and taxiways and turned to the shelter sites. The Americans searched for quarry sites and experimented with compaction techniques to determine the equipment and procedures needed.[16]

At the end of the summer the Corps established the administrative units, known as area offices, that would manage the operations at the sites. For projects costing nearly $500 million each, the offices

were small. Each had an authorized personnel strength of fifty-six in addition to the design liaison branch from Tel Aviv. The executive office consisted of seven people—the area engineer and deputy, two project engineers, an attorney, a secretary, and a clerk-typist. The rest of the area office was divided into five parts, each of which reported to the executive office. Contract management, under a supervisory civil engineer, had ten employees in two sections—a supervision section and a reports section. The construction office, also under a supervisory civil engineer, had seventeen divided among the horizontal and vertical teams. Administrative services, with eleven people under a supervisory management specialist, handled communications, traffic, security, and public affairs, as well as administration and mail. Procurement and supply was carried out by three people—a contract specialist, a procurement agent, and a procurement assistant. Resource management had eight employees, with a supervisory operating accountant in charge.[17]

Like Gilkey, the commanders at the sites were colonels and former district engineers. O'Shei, who headed the Ramon Area Office, was well acquainted with his contractor. The Guy F. Atkinson Company had built New Melones Dam on California's Stanislaus River during his tenure in Sacramento District. Curl, his counterpart at Ovda, had been Kansas City District engineer but went to Israel from the office of President Carter's science adviser. Morris chose both of them and, as Johnson said, "They were picked because they were good. [Either] one of them could have been promoted to general, and one of them [O'Shei] was."[18]

Theirs may have been the most critical jobs of all. Much more than engineers, they were management and government as well. As contracting officers for their respective construction contracts after 6 March 1980, the area engineers made critical decisions regarding the legitimacy of contractor expenditures and actions. As the senior officials at the sites, they also provided the equivalent of community government for the thousands who lived there. Their highly visible jobs involved substantial risks of failure and promised significant rewards for success. Such an assignment could make or break a colonel's career.[19] Both relished the work. Curl had told Johnson that he wanted the most difficult of the two sites. Johnson thought Ovda might prove to be the most troublesome so he sent Curl there. O'Shei was also an aggressive manager and responded to concern about problems that might delay completion with Henry V's "he which hath no stomach to this fight, let him depart."[20] The selection of these energetic, assertive former district engineers reflected the criticality of their jobs and the mission.

Two substantial requirements stood in the way of an immediate construction start. Israeli scholars had anticipated the need to expose the sites of earlier civilizations and preserve the important objects that might be found. Yigael Yadin, who was the nation's leading archaeologist as well as deputy prime minister, sounded the alarm months before the actual site surveys began. The withdrawal of the Israel Defense Force from the Sinai endangered more than the sites that might lay beneath the surface at Ramon and Ovda. Other construction would occur, for the armored forces and artillery as well as for air bases, and most of it would be in the Negev.[21]

The archaeological digs would come, but the more compelling initial obstacle to construction involved unexploded ordnance—duds—on the sites. A large portion of Israel had been battleground in one war or another, but earlier conflicts did not directly create the problem. The Israeli armed forces had for some years used both places for firing practice. The air force had bombed mock runways at Ovda, while a nearby artillery school and the fliers had used target areas at Ramon. No one knew the number or kinds of duds scattered over the sites, but estimates included bombs as large as 299 kilograms. The Ministry of Defense assumed responsibility for removing the duds, and by July 1979 an Israeli Air Force team was in the desert. Soon it became apparent that visual sweeps with hand-held magnetic mine detectors were inadequate. Particularly at Ovda, the drifting soil filled bomb craters and covered duds. The presence of shrapnel and other metal debris also complicated detection.[22]

The magnitude of the job caught everyone by surprise. Certainly, the government-to-government agreement had not designated a responsible party. Bar-Tov and the Ministry of Defense had responded to the problem without such a mandate. However, the seriousness of the matter was soon clear. Schechet warned Gilkey that clearance of explosives represented "potentially the most serious issue that has arisen to date." Thorough and prompt action was needed to avoid construction delays and increased costs and to protect workers.[23]

While the Israelis probed the sites, the Americans wrote home for help. They needed detecting equipment that could find ordnance under twelve feet of gravelly silt. With the help of the support office in New York, the project settled on the Ferex 4.021 sweeper, a West German product that was available in the United States. The project needed sixteen of the detectors, but the factory in Germany turned down the request for the equipment, explaining that "due to delivery liabilities assumed by us for various Arabic states, in the past months, we have bound ourselves in writing not

to supply these instruments to Israel." Only one could be found at a dealer in the United States. That one was shipped to Israel.[24]

Removal continued through the summer and fall. Sometimes the rate of progress caused anxiety for Gilkey and the managers at the sites. At Ramon Butler noted with an eye to the possible response of his Portuguese work force that "discovery of duds during excavation could cause a severe unplanned stoppage of work."[25] The Ovda team had problems reaching an agreement with the Israelis on the sequence of areas to be cleared, but completed most of its sweeps in October and went to augment operations at Ramon. The Israeli Army reserve units that did most of the work at Ramon did not always share the same sense of urgency as the Americans who looked on and waited. Nevertheless, work proceeded. The numerous duds found included as many as 100 objects unearthed in a 200-square-yard area. Each evening, after the workers returned to camp, these bombs were detonated where found. Most of the site was cleared by late November. A small ordnance disposal team stayed to detonate munitions uncovered during construction.[26]

The inevitable accident came in mid-December. Six workers involved in cutting an access road to a gravel site were taking their lunch break when a small bomb exploded less than ten meters away. The dud scattered metal fragments and injured three of the men. Because there were no hand injuries, investigators concluded that none of the workers had disturbed the ordnance; it may have been activated by construction equipment. Thereafter, workers were permitted to take their meals or park equipment only in areas that had been cleared by heavy equipment, such as bulldozers with sheepsfoot rollers.[27]

Underground explosives were not the only peril. Several times, Israeli pilots brought their jets in low over the sites, sometimes below crane boom level, for practice strafing passes over vehicles. "You do not hear the aircraft coming," wrote Lt. Col. Jack Clifton at Ramon. "When they pull out and hit their afterburners," he complained, "there is a tremendous roar and noise, which is very painful to the ears of the workers that are directly underneath."[28] On 24 October Clifton counted twenty-seven such runs within two hours. He was angry and willing to fight back. He did "not see why they have to continue to insist upon diving after the vehicles driving down the road, flying directly over the work site, and proving a general nuisance to all workers on the site." Clifton, whose grin hid a feisty spirit, did not find the runs amusing: "We will begin detonating very shortly, and it might be fun to see if they can time

Nose of a 750-pound bomb exposed at one of the sites during the clearance of unexploded ordnance.

an explosion at the same time that an aircraft comes over. We may get their attention."[29]

The aviators might have considered the overflights harmless pranks, but at other times and places, they had more than fun in mind. For example, in April 1977 five Israeli Kfirs had swooped down on the Saudi air base at Tabuk, about 120 miles southeast of Eilat, made a practice bombing run over the strip, and roared off. Repeat performances underscored Tabuk's vulnerability and Israeli dominance of the skies.[30] The message left at Ramon and Ovda was not as clear. Still, the overflights may have represented opposition to the unprecedented American involvement in Israeli defense matters or to the withdrawal from the Sinai. Such resistance surely existed within the Ministry of Defense and remained a concern for the U.S. Department of State until the departure from the peninsula actually took place.[31] In any case, the Americans on the sites were not amused by such playfulness.

The contractors complained to Tel Aviv. The Ministry of Defense first responded by limiting overflights to 300 feet, hardly

restrictive enough according to some of the Americans. Hartung pointed out that the planes represented the purpose for the bases and that a higher limit would inhibit the Israeli training program. The complaints persisted, and the Israelis finally agreed to the same 400-meter restriction imposed over Israeli civilian communities.[32]

The planes were still overhead and the duds were still under foot when the archaeologists came. They started at Ramon in October, where they provoked considerable interest but did not appear to get in the way of construction. At Ovda they began later, in January 1980. There the area office provided the diggers with water, portable toilets, and medical support.[33] Although Air Base Constructors' weekly reports from Ramon never indicated that the archaeologists disrupted operations, the *New York Times* painted a different picture. In two November articles, one of which was picked up by the *International Herald Tribune*, David Shipler wrote of scholars racing bulldozers in an attempt to complete excavations.[34] Although assured by Rudolph Cohen of the Israeli government's Department of Antiquities that the constructors did "their best not to destroy sites . . . ," Shipler left an impression of frantic graduate students chased by crazed engineers atop earthmovers and power shovels.[35]

These newspaper accounts had no bearing on the actual conduct of the archaeological digs. By March 1980 the work was finished at both sites. The vigilant and pugnacious Israeli press followed the operations but did not complain about Corps of Engineers' handling of the excavators.[36] When construction workers at Ramon exposed a small cave while digging for a taxiway, O'Shei halted construction and notified Cohen so that he could evaluate the find.[37] At Ovda Corps cooperation brought a note of thanks from the Department of Antiquities to Curl and his deputy, Lt. Col. Bruce F. Miller.[38]

While the unfavorable attention of the *Times* did not affect the conduct of operations, it did have an impact on the Corps of Engineers, from Tel Aviv all the way to Washington. Secretary of the Army Clifford Alexander's office asked the Corps to explain the situation characterized in Shipler's articles. Gilkey answered with his assessment of area office relations with the archaeologists, passed it to New York, and thence to the chief's office in Washington and finally the Pentagon.[39] The response from the Corps satisfied Alexander, but did not end the matter. Before the issue faded, the Washington office had to answer a letter from an irate scholar who had read the *Times* articles. Philip King, president of the American Schools for Oriental Research, complained about the callous indifference of the Corps to the cultural heritage of the Is-

raelis and about the Corps' failure to finance archaeological work at the air base sites. For good measure, he sent copies of his letter to President Carter, two senators, one representative, and the heads of some executive agencies.[40]

General Wray in Military Programs Directorate and Maj. Gen. E. R. Heiberg III, director of Civil Works, replied separately to the letter. Director of Antiquities Eitam also assured King of the good relations his archaeologists had with the Corps.[41] But, as Heiberg noted in his reply, "Your letter to me went to many who watch and judge our work: the President, two Senators, and others. . . . I ask you if you can suggest to me a way to put this matter into perspective in the minds of those who judge the Corps?"[42] As in the case of the original article, the damage was already done.

Preserving the evidence of the remote past and clearing unexploded ordnance were not the only prerequisites to construction. Establishing a reliable communications network was vital. The project needed a system connecting the sites to the Near East Project Office and Tel Aviv to the United States, for transmission of computer data as well as for message and telephone traffic. The program made some provision for such a system from the start. Col. Newton B. Morgan, the Signal Corps officer who was chief of the communications division at the Corps' Washington office, arrived in Israel shortly after Gilkey did. During his two-month stay, he began work on connections with the sites. More important, he urged the addition of a communications expert to the permanent project office staff to manage development in this important field.[43]

Col. Donald Wong, who followed Morgan at the end of June and remained as communications manager, faced three major challenges. The desert environment represented the least of them. Radio connections with Ramon, which sat atop a plateau, were established easily. The mountains that surrounded Ovda made contact more difficult, but it was still possible.[44] The two major problems were the Israeli communications system and the project's own procurement rules.

As a military communicator, Wong was accustomed to assessing his needs and bringing to bear the necessary Army resources. So he probably would have found making arrangements with any public utility system something of a challenge. The Israeli Postal, Telephone, and Telegraph system in the Ministry of Communications, known as the PTT, was something special. It was notorious for its backlog of telephone installations, estimated by some to number in the hundreds of thousands and to extend back several years. PTT horror stories, featuring repairmen who refused to work until they caught enough fish for lunch or installers who

demanded meals before doing their jobs, abounded. Wong had to break into this intimidating bureaucracy and make it work. In Israel there were no alternatives. The public system monopolized installation and maintenance of all telephones.[45]

He found dealing with PTT less daunting than it first appeared. As communications specialist Kenneth Keener noted, "We never found any unwillingness to support us." Wong still had concerns. Israel was a small and densely populated state with few available radio frequencies. As a result Wong found himself competing with residential users and businesses for circuits. In addition, equipment had to be compatible with the government of Israel's standards for two reasons: PTT would do all repairs during the life of the program, and equipment purchased for the program would remain in the country as the property of the Israeli government once the job was done.[46]

Wong's third area of concern involved changes in the rules governing procurement. Early in the spring the program had agreed to the Israeli request for increased purchases from local sources. For Wong the growing emphasis on buying and hiring within Israel signaled a need to expand the communications network. He and his staff of three civilian communications management specialists—Keener in Tel Aviv and one at each construction site—had their work cut out for them.[47]

Unlike Wong in Tel Aviv, with his multiple problems, the people at the sites had a straightforward concern for more and better communications. Through the summer and into the fall of 1979, managers for the contractors and the government complained of inadequate radios and telephones. Curl considered unsatisfactory links his greatest problem. Butler, with his managers living and working in Beersheva and his workers on site at Ramon, feared major delays were in store. Solutions were a long time coming. The contractors bought mobile radios for on-site communications and borrowed single side-band sets from the Israelis for contact with Tel Aviv. Meanwhile, the Israeli Air Force installed tactical microwave systems while working on the communications buildings at both sites. All the while PTT, which refused to carry out any installation before completion of the buildings, waited. Apparently, the postal and telegraph system was not interested in carrying out some fast-track construction.[48]

The difficulties persisted until permanent base communications were established in the autumn of 1981. Interim measures never provided reliable and clear connections, and efforts to rectify the situation sometimes created friction between the Americans and Israelis. Some Americans, Wong included, became skepti-

cal of Israeli commitments and complained that the Israelis were slow to respond to problems. As Wong said when informing Ovda that PTT planned to complete circuits to Tel Aviv, "Don't hold [your] breath." [49]

Problems involving communications, unexploded bombs, and archaeological sites were superimposed on the main job of setting up camps from which to carry out construction. The work itself was a major undertaking. With nothing but empty desert where the bases would go, both operations started from interim facilities elsewhere. The Corps and Negev Airbase Constructors set up shop on 2 September 1979 near the port of Eilat. Work at Ramon started earlier in the summer from rented quarters at the Desert Inn in Beersheva, first in a small ballroom and then spreading into office trailers in the hotel parking lot. The contractor's management personnel lived in the hotel and commuted to the site in pickup trucks and vans rented in town from Avis. The drive from each town to its site took at least an hour.[50]

These offices in town directed the first construction efforts while the Israeli Air Force assembled premobilization camps for the first 80 to 100 people at the sites. The contractors objected to the austere Israeli trailer camp, but Carl Damico told them "they are going to use it unless they show me how they can get it cheaper, quicker and I don't think they can do that."[51] The contractors used the Israeli facilities but were never happy about it. Complaints ranged from lack of furniture and electric outlets to dirty rooms. Moreover, the Israelis did not finish assembling the buildings on schedule and did not try to compensate with overtime work. All told, Butler concluded "for the record that relying on the IAF for the premobe camp was a mistake." [52]

The disagreement over the camp lasted into the winter. New preengineered buildings for use as residences and offices began to arrive in large numbers during the fall. As they went up at Ramon, management and administrative staff moved onto the site. "You can imagine the boost in morale," Butler reported, "when you have your own bed without a two-hour bus ride every day." By mid-December Ramon also had rooms for 240 Portuguese workers. However, at the end of the year 85 Portuguese still lived in the premobilization camp, and Butler faced "the albatross of the IDF premobe camp" until almost the end of January 1980.[53]

Completion of the permanent camp buildings removed one source of contention but spawned another. At Ovda the Israelis wanted to locate the construction camp and industrial facilities so that they could be incorporated into the permanent base. The Israelis, who would own the mobilization structures after construc-

tion of the bases anyway, hoped in this way to delete some facilities from the plan of work and reduce the cost of the project. The Americans made some effort to accommodate the Israelis by reviewing construction plans with this interest in mind. Nevertheless some facilities were installed so that their continued use was impossible. Overall, General Bar-Tov wanted the mobilization camp on the east side of the runways where the hills protected buildings from direct Jordanian observation, but the contractor installed it on the west. Other problems also occurred, such as the truck scales that were put so close to the runway that they would have to be relocated after the base became operational. So the attempt to plan for long-term use never succeeded.[54]

The deeper issues that divided the Israelis and Americans in these matters recurred from time to time. The Americans, many of whom considered timely completion their primary goal, lacked patience with the more measured pace at which the Israelis did business. The Israelis, on the other hand, placed a greater emphasis on economy.

The premobilization camps were still in use when the workers started to come into Israel. The arrival of large numbers of foreign construction workers in Middle Eastern countries was not unusual. Oil-rich Arab nations with elaborate development plans compensated for their lack of skilled labor forces by importation. In 1980 the government of Saudi Arabia acknowledged the presence of one million such workers in that country, although one estimate put the number at more than twice as many. At the same time, some countries with chronic unemployment regularly exported labor to the Middle East. This practice reduced the likelihood of unrest at home and brought in badly needed foreign exchange. Foremost among this group of nations was the Republic of the Philippines. Thailand and Portugal, which were eighth and ninth on this list in 1979, furnished the workers for the air base program.[55]

The first Thai laborers came to Ovda in mid-September. Curl explained that they had been chosen because "they are industrious, hard-working and have experience in this sort of thing," having worked on American air bases in Thailand before and during the war in neighboring Vietnam. The Thais did not bring much with them. Many lacked adequate work clothes, some had no shoes, and most had practically no money. A supervisor lent some of the early arrivals money for tennis shoes. At the same time, very little awaited the first workers. No recreation facilities had been established. Only the mail that started trickling in during October offered any reading material, and spices and condiments for their dining hall were a long time coming. In spite of the lack of diversion, the Thais rarely

ventured out to Eilat after their ten-hour workdays. Early in 1980 their pay averaged around $400 per month.[56]

Portuguese workers began to arrive at Ramon around the same time. Here too delivery of the special foods needed for the labor force—tripe, pigs' heads and feet, pork kidneys, cod, and sardines—was slow. The Portuguese were more experienced in the construction trades than were the Thais and were recruited in smaller numbers. Their wages ran about 2.5 times higher than Thai pay, averaging over $10,000 a year. Supervisors were "generally pleased with the performance of the Portuguese workers."[57]

Although importing labor was a fairly standard practice in the Middle East, it was unusual for Israel. The nation lacked the capital resources of its more prosperous neighbors. On the other hand, it did have a skilled and versatile labor force, much of which was organized in Histadrut, the articulate and powerful labor federation. Histadrut was unlike any labor organization in North America. A major industrial employer, it owned a number of large firms, including Solel Boneh, which was by far Israel's largest construction company and one of the largest in the world. In 1981 Solel Boneh's worldwide design and construction contracts exceeded $450 million. Histadrut had strong ties to the Labor Party, which dominated Israeli politics until the 1977 election of Prime Minister Begin, and it is unlikely that a Labor government would have risked the federation's ire by insisting on a foreign work force. In its political and entrepreneurial as well as its unionist activities, Histadrut combined the Zionist ideal of rebuilding the land of Israel and the socialist goal of a Jewish workers' state. It was a formidable organization, and its voice would be heard frequently.[58]

Workers and their living quarters represented only part of the mobilization requirement. Along with billets and offices came kitchens, utilities, and support services such as infirmaries, banks, post offices, and laundries. Recreation facilities included theaters, soccer and softball fields, handball courts, and swimming pools. In October 1979 Ovda also put in a desalinization plant to purify water piped onto the site from wells in the Arava. Construction demanded huge quantities of water for grading, compaction, and excavation, all of which could use saline water, as well as for mixing concrete, which required sweet water. Early estimates put peak daily needs for compaction alone at about 5,000 cubic meters or roughly 1.3 million gallons. Experience later validated these predictions.[59]

The Israelis initially trucked water to both sites. Meanwhile, the national water company, Mekeroth, built pipelines from Ramon to the Sea of Galilee far to the north and from Ovda to the Arava

Ramon access road

wells. The constructors also installed 25,000-cubic-meter storage ponds that were lined and covered with plastic. At Ovda, providing a consistent supply for the work force proved early to be a significant problem. Before the purification plant began operation at the end of October, shortages were "severe and inexcusable," according to Curl. In later months occasional breakdowns at the plant required management to issue bottled water for drinking and to pipe brackish water to the billets for sanitary use.[60]

Sometimes the construction emphasis during these early months seemed to go too far toward providing amenities. Curl rejected the contractor's plan for two olympic-size swimming pools for the work camp as "clearly in excess of the requirement and with no apparent consideration for cost control." He insisted on reviewing all subsequent plans for recreation facilities.[61] The impression of an undue emphasis on creature comforts persisted among some Americans as well as Israelis. General Lewis said after a December visit that the Ovda contractor's "concern for the welfare of his people is obvious in the facilities built and planned." He thought "the energy flowing from this concern should be engaged

in productive work rather than on recreational facilities." "The camp," Lewis concluded, "is not austere."[62]

Food was a necessity but also an important pleasure to workers on a remote construction site. A subsidiary of RCA provided satisfactory service at Ramon. Ovda started with a temporary contract with a joint venture called MEML-Tamam. MEML, or Middle East Manpower and Logistics, was based in Hong Kong. The other part of the firm, Tamam Aircraft Food Industries of Tel Aviv, provided catering service to Israel's El Al Airline, whose food had a poor reputation among international travelers. Ovda too had many unhappy customers. "U.S. personnel," Pettingell reported in November, "are upset, dissatisfied and on the verge of riot activity." Award of the permanent contract to American-owned Dynateria stabilized matters, but only after MEML-Tamam failed to overturn the award in the Israeli courts.[63]

Comforts were not shared equally. Each site had two separate camps, one for Corps and contractor management and another for the workers. Initial plans at Ramon called for single eight-by-ten rooms for the Americans. Unhappiness over this policy led to an increased allocation.[64] Americans moved into two-room suites similar to those at Ovda. Portuguese and Thai workers lived four and eight to a room, depending on their job levels. One Israeli newspaper referred to the arrangement as "upstairs-downstairs."[65]

In addition to accommodations for workers and managers, mobilization required a wide range of structures and plants for base construction. While some of the workers assembled the billets, others graded shop areas and poured concrete pads for preengineered maintenance shops and warehouses and for open storage yards. They also installed fuel storage tanks and a filling station. Industrial facilities included processing plants for construction materials, including a shop for storing, sorting, and bending reinforcing steel. Roads were opened to quarry sites, where rock crushers were assembled. Then came asphalt and concrete batch plants.

Although not as significant as construction for mobilization, work on air base facilities also started in 1979. Earliest among these at both sites were the access roads that would connect the bases to the main north-south highway through the Negev and the perimeter security system of fences and roads. Work on both sites started in October. At Ovda the contractor experimented with several methods of excavating and placing fence posts in the loose granular soil before deciding to cut a continuous trench. Within a short time seven-man crews daily set 250 tapered forms, emplaced as many posts, and poured concrete. At Ramon the ground proved too rocky for earth augurs, and the workers used air track drills with six-inch

rock bits to dig post holes along the nineteen-mile network of fences. Work at both places continued through the winter.[66] Completion of the access roads took considerably longer. The fifteen-kilometer road to Ovda and the ten-kilometer connection to Ramon began as crude trails. In the course of construction they were widened to accommodate large pieces of equipment, compacted, and graveled. Only toward the end of the project were they paved.[67]

Early construction at both bases was defined in large measure by the special characteristics of the sites. Not only did the terrain determine the respective approaches to perimeter security and much later construction, but each site had unique construction requirements. At Ramon, 300,000-cubic-meter Glide Path Hill, an obstruction to planes approaching the main runway, had to be leveled. Workers gradually reduced the hill with explosives. They trucked the rubble to haul roads and the mobilization camp as fill while gaining experience with the heavy equipment that they used on other work at the site.[68]

Ovda's location in a flood-prone wadi required developing a protective network to carry off the waters that rushed through the valley. The 31-mile system of diversionary channels and dams was designed to protect the base from a deluge so severe that it was likely to occur only once every 100 years. Even Israeli engineers thought the danger remote. Nevertheless, those who worked there came to appreciate the protection offered by the system. In December 1980 a storm and flood of almost biblical proportions inundated the site. Two days of rain washed out all the roads and filled excavations, stopping most work for six days and setting back digging of the communications ducts by nearly one month. A day after the rain stopped, the excavations still held water but the site showed only minimal ponding because the diversion ditches carried away most of the water. "Flood control devices," Deputy Area Engineer John J. Blake said, "worked as they were intended to. If anybody had any doubts that they were necessary, they should have been here last night."[69]

The development of the shelters in the last few months of 1979 showed fast-track procedures in operation. The work proceeded on several parallel lines, as foundation design, excavation, and purchasing of materials started. While the Israelis selected their design, the Americans evaluated footings for the shelters. The depth of bedrock at the locations varied by as much as eight meters. The use of driven piles for foundations, previously considered a possibility by Hartung, was once again mentioned. However, neither contractor possessed equipment for this costly alternative.

Bulk cement storage facility under construction at Ovda in the spring of 1980.

The engineering division decided to use spread footings, set into bedrock where possible, and elsewhere on structural fill.[70]

In October the contractors received the general plans for adaptation to the sites and for procurement action. Meanwhile Israeli architects continued to work on foundation plans. The foundations at Ovda still troubled Curl. He remained unconvinced of the adequacy of footings for some of the shelters. To stay on the excavation schedule while tests continued, he convinced the contractor to concentrate on the complexes with sound footings. Pilings finally proved unnecessary, and by late November all excavation drawings were done.[71]

While these questions of foundations and the sequence of excavation were resolved, the major issue remained progress on design. Numerous Israeli firms, their work coordinated by the Israeli Air Force, worked on parts of the plans. Warren Pettingell complained that these architects took too long and kept him from meeting his schedule.[72] Fred Butler found the situation confusing and frustrat-

ing. The shelters, Butler wrote, "are on the critical path and have been, thus far, locked into forces and agencies beyond our effective control."[73] Drawings trickled in throughout late autumn until finally all were available before the end of December.[74] Butler's relationship with Israeli architect-engineers reflected his frequent complaints about the multiplicity of firms doing the work, the problems associated with piecing together numerous small pieces of design, the complex approval process, and translations. For example, one group of six hangars and ancillary facilities at Ramon involved 175 separate sheets, all of which needed translation, piecing together, adapting to the site, and procurement action.[75]

Even with the contractors completing the drawings and releasing them for construction through the winter of 1980, work on foundations was already well under way. The Ovda contractor completed excavation for nine of the ten complexes in February. Within a few days the precast plant at the site began production of panels for the walls. At Ramon earthwork for the shelters started in December, even before anyone was sure that the scrapers would not encounter rock that required blasting. Digging for the first group of six hangars required removing 163,000 cubic meters of earth. By March the work of digging and pouring footings proceeded routinely.[76]

The earthmovers still uncovered unexploded ordnance at Ramon. At one complex deep detection equipment turned up twenty-three duds, but work crews found still more. Their excavators cut into two white phosphorous projectiles, which ignited and flared but caused no damage. At other times demolition experts exploded 500-pound bombs, sending shock waves through the housing areas.[77]

In spite of the many construction activities that were under way, mobilization dominated on-site operations until well into the spring of 1980. The little construction of permanent facilities that took place was based on available plans and materials rather than on logical construction sequences. Both sites built what they could as fast as they could and hoped that plans and materials would catch up. This situation soon changed. In March the project was entering one of the many transitions that came in rapid succession throughout the life of the job. The contractor at Ovda reported that construction was beginning to take priority over support activities. A month later Butler at Ramon wrote that "the mobilization phase of the project is drawing to an end." In June the headquarters in Tel Aviv confirmed these views and directed that both area offices shift their emphasis to permanent facilities. Permanent construction was in full swing.[78]

Notes

1. *New York Times*, 2 Feb 81.

2. ABC Weekly Progress Report, 31 Oct 79, IABPC, 12/18.

3. The territories include the Gaza strip, East Jerusalem, the West Bank of the Jordan—called Judea and Samaria by the Israelis—and the Golan Heights.

4. David Ben-Gurion, "Introduction," in Yaacov Morris, *Masters of the Desert* (New York: G. P. Putnam's Sons, 1961), p. 11.

5. Moshe Dayan, *Moshe Dayan: Story of My Life* (New York: Warner Books, 1977), p. 187.

6. Morris, *Masters of the Desert*, pp. 22, 29–46, 48, 100–101, 104–05; Zev Vilnay, *The Guide to Israel* (Jerusalem: Daf-Chen Press, Ltd., 1980), p. 339.

7. Ben-Gurion, "Introduction," in Morris, *Masters of the Desert*, p. 11; Dan Kurzman, *Ben-Gurion: Prophet of Fire* (New York: Simon and Schuster, 1983), pp. 274, 354–55, 367–69.

8. Burton Bernstein, *Sinai: The Great and Terrible Wilderness* (New York: The Viking Press, 1979), p. 35.

9. Lesley Hazelton, *Where Mountains Roar, A Personal Report from the Sinai and Negev Desert* (New York: Holt, Rinehart and Winston, 1980), pp. 150–51.

10. Meron Benvenisti, *The West Bank Data Project: A Survey of Israel's Policies* (Washington, D.C.: American Enterprise Institute for Public Policy Research, 1984), p. 25.

11. DF, Bazilwich, Deputy NAD Engineer for Military Construction, to Chiefs of Divisions, NAD, 15 May 79, sub: Site Designation of Israeli Airbases, NAD PAO files.

12. Daniel Hillel, *Negev: Land, Water, and Life in a Desert Environment* (New York: Praeger Publishers, 1982), pp. 79, 118.

13. Herzog, *The Arab-Israeli Wars*, p. 104; Kurzman, *Ben-Gurion*, pp. 309–10.

14. Telex, USDAO Tel Aviv (Gilkey) to DAEN-MPC, 20 Apr 79, sub: Israeli Airbase Program Development; Telex, USDAO Tel Aviv (Hartung) to HQ USAF, 23 Apr 79, sub: Israeli Air Base Program Development, Sitrep No. 1; Telex, USDAO Tel Aviv (Hartung) to HQ USAF, 14 May 79, sub: Israeli Air Base Program Development, Sitrep No. 4; Telex, NEPO to NAD, n.d. [c. 1 Oct 79], sub: Information for MG Lewis Address to Professional Engineers, NAD PAO files.

15. Telex, USDAO Tel Aviv (Hartung) to HQ USAF, 14 May 79, sub: Israeli Air Base Program Development, Sitrep No. 4; Telex, NEPO to NAD [c. 1 Oct 79]; Lt Col Robert Hughes, Briefing for Secretary of the Army Clifford Alexander and General Edward Meyer, 30 Jul 79, DAEN-MPC-G files.

16. Ltr, Schechet to NEPO Project Manager, 30 Jul 79, sub: Interim Report No. 2; Butler, ABC Weekly Progress Report, 25 Jul 79, IABPC, 12/4.

17. Organization Chart, Area Offices, 20 Sep 79, IABPC, 88/5.

18. Johnson interview.

19. Bar-Tov interview, May 82; Interv, author with John F. Wall, Aug 80, Tel Aviv; Ltr, Col Donald M. O'Shei to NEPO Project Manager, 15 Mar 80, sub: Ramon Air Base Progress Report for the Week Ending 13 Mar. 1980, IABPC, 13/19; Ltr, Gilkey to O'Shei, 7 Mar 80, sub: Designation of Successor Contracting Officer, IABPC, 32/3.

20. Telecon transcript 10, 14 May 79, IABPC, 10/3; Wall, Project Notebooks, vol. I, 22 Jun 80, IABPC, 90.

21. *New York Daily News*, 6 Dec 78; *New York Times*, 2 Feb 81.

22. Telex, NEPO (Col Richard L. Curl) to NAD (Bazilwich), 13 Jul 79, IABPC, 65/1.

23. Ltr, Schechet to NEPO Project Manager, 30 Aug 79, sub: Interim Report No. 3.

24. Telex, NEPO (Curl) to NAD (Bazilwich), 13 Jul 79; Telex, NEPO (Maj Stephen T. Sharr) to Herr Lange, Institute Dr. Foerster GMBH & Co., Reutlingen, FRG, 16 Aug 79, IABPC, 65/4; Telex, Foerster Institute to NEPO, 22 Aug 79, IABPC, 65/3; Telex, NEPO (Curl) to NEPO-Rear (Pagano), 9 Sep 79, sub: Purchase of Additional Ferex Detector, IABPC, 65/6; Telex, NEPO (Curl) to NEPO-Rear (Pagano), 17 Aug 79, sub: Dud Removal, IABPC, 65/4.

25. Butler, ABC Weekly Progress Report, 25 Jul 79.

26. NEPO Sitrep No. 13, 21 Oct 79, IABPC, 12/16; Memo, Lt Col Jack H. Clifton, Deputy Area Engineer, for Col O'Shei, 28 Sep, 7 Oct, and 22 Nov 79, sub: Weekly Progress Report Ramon, IABPC, 30/3.

27. Memo, Mishap Board of Investigation (Lt Col Joseph A. Beben, USA; Lt Col Thomas J. Stepetic, USAF; Capt Benny Har-Gev, IAF) for Project Manager, 28 Dec 79, sub: Mishap at Ramon Air Base 12 Dec. 1979, IABPC, 31/1.

28. Memo, Clifton for Area Engineer, Ramon, 26 Oct 79, sub: Weekly Progress Report, Ramon, IABPC, 30/3. Also see MFR, Curl, 31 Oct 79, sub: Narrative Report, Week of 21–26 Oct. 1979, Ovda site; Weekly Sitrep, Construction Division (Baer), 28 Oct 79. All in IABPC, 22/3.

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30. David Holden and Richard Johns, *The House of Saud: The Rise and Rule of the Most Powerful Dynasty in the Arab World* (New York: Holt, Rinehart and Winston, 1981), pp. 479, 486.

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33. ABC Weekly Sitreps, 31 Oct, 7, 12, 19, and 26 Nov 79, IABPC, 12/18, and 13/1–3; OAO, Master Diary, 9 Jan 80, IABPC, 84/4.

34. *New York Times*, 4 and 18 Nov 79; *International Herald Tribune*, 20 Nov 79.

35. *New York Times*, 4 Nov 79.

36. See, for example, (Tel Aviv) *Al Hamishmar*, 3 Feb 80; (Tel Aviv) *Ha'aretz*, 11 Feb 80; *Jerusalem Post*, 28 Feb 80 and 17 Mar 80.

37. Memo, O'Shei for Project Manager, 22 Mar 80, sub: Ramon Air Base Progress Report for the Week Ending 20 Mar. 1980, IABPC, 14/1.

38. Ltr, Avi Eitan, Director of Antiquities, Department of Antiquities and Museums, to Curl and Miller, 11 Mar 80, IABPC, 87/11.

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40. Ltr, Philip J. King to Maj Gen E. R. Heiberg III, 21 Jan 80, IABPC, 87/11.

41. Ltrs, Wray to King, 5 Feb 80; Heiberg to King, 27 May 80; Eitam to King, 31 Mar 80; all in IABPC, 87/11.

42. Ltr, Heiberg to King, 27 May 80.

43. Interv, author with Col Donald Wong, Aug 80, Tel Aviv, Israel; Interv, author with Kenneth Keener, Aug 80, Tel Aviv, Israel.

44. Wong interview.

45. Wong and Keener interviews.

46. Ibid.

47. Wong interview.

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62. Ltr, Lewis to Morris, 26 Dec 79, IABPC, 1/7.

63. Weekly Report 18, Pettingell to Curl, 23 Nov 79, IABPC, 13/4; Weekly Report 19, Pettingell to Curl, 30 Nov 79, IABPC, 13/4; NEPO Sitrep No. 20, 10 Dec 79, IABPC, 13/5; (Tel Aviv) *Mabat*, 28 Nov 79.

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65. (Tel Aviv) *Ha'aretz*, 21 Dec 79.

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68. "Israeli Air Bases," *ENR* 205 (30 October 1980): 29.

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73. ABC Weekly Sitreps, 12 and 26 Nov 79, IABPC, 13/1 and 3.

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78. OAO, Master Diary, 27 Mar 80, IABPC, 84/4; ABC Weekly Progress Report, 8 Apr 80, IABPC, 14/3; Memo, Wall for Area Engineers, 11 Jun 80, sub: Base Camp Construction, IABPC, 33/1; Lloyd interview.